ROCKY FLATS
Jefferson County, Colorado

TECHNICAL REVIEW OF DRAFT FINAL PHASE II RFI/RI WORK PLAN (BEDROCK) FOR OPERABLE UNIT NO. 2

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region 8 Federal Facilities Remedial Branch
Denver, Colorado

Work Assignment No.	:	C08055
EPA Region	:	8
Site No.	:	CO78900010526
Date Prepared	:	April 3, 1991
Contract No.	:	68-W9-0009
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TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

PRC Environmental Management, Inc. (PRC) has completed a technical review of the "Draft Final Phase II RFI/RI Bedrock Work Plan" (work plan) for operable unit 2 (OU2), Rocky Flats Plant, Golden, Colorado. PRC has prepared this report for the U.S. Environmental Protection Agency (EPA) under contract number 68-W9-0009, technical enforcement support (TES) 12, work assignment number C08055.

This review is divided into a technical review comments section (Section 2.0) and a conclusions section (Sections 3.0). The work plan reviewed consistently references the OU2 Phase II RFI/RI alluvial work plan, the site-wide quality assurance project plan (QAPjP), and specific standard operating procedures (SOPs). These documents have also been reviewed, to the extent necessary, to evaluate the appropriateness of the references in the work plan.

2.0 TECHNICAL REVIEW COMMENTS

The technical review comments are divided into sections corresponding to the major work plan sections. Additionally, the technical review comments for each work plan section may be divided into general and specific comments. The general comments apply to the work plan section overall while the specific comments are keyed to specific statements or items within the work plan section. In general, editorial and typographical errors have been avoided, except where accuracy or consistency within the work plan is affected.

2.1 INTRODUCTION

General Comment

1. This section frequently references Figure 1-7 as Figure 1-6. This should be corrected in the final document.

   Rationale: Correct reference to appropriate figures facilitates use of the document.

Specific Comments

2. Page 1-2, Figure 1-5. The lithology description at the base of the Laramie Formation has been incorrectly labeled claystones in this Figure. This should be corrected to sandstones in the final document.

Rationale: The figure needs to be corrected to correspond to discussions on the text (Page 1-15, Paragraph 3).

3. Page 1-15, Paragraph 3. This paragraph states that the upper claystone in the Laramie Formation is greater than 700 feet thick. However, this is not in agreement with the local stratigraphic section shown in Figure 1-5 (page 1-12). Figure 1-5 indicates that the upper claystone is 407 feet thick and that the entire thickness of Laramie Formation is 692 feet. This discrepancy should be resolved.

Rationale: Consistency between figures and text discussions increases the utility of the work plan.

Page 1-19, Figure 1-7. Individual hazardous substance site (IHSS) number 111.8 is mislabeled in Figure 1-7 as IHSS number 118.6. This should be corrected in the final document.

Rationale: The figures needs to be corrected to correspond to discussions in the text (Section 1.4.3).

2.2 SITE CHARACTERIZATION

Specific Comments

Page 2-1, Section 2.1.1.1. The third sentence states the large paleogully starts south of the east end of the East Trenches Area. This should be corrected to the west end of the East Trenches Area. Examination of Figure 2-2 shows the paleogully beginning south of the west end of the East Trenches Area.

Rationale: Consistency between figures and text discussions increases the utility of the work plan.

Figures 2-6A, 2-6B, 2-7A, 2-7B, 2-8A, 2-8B. These cross sections could be improved if the sections' respective ends were designated on the section diagrams themselves (for example A-A' and so on). It would also be more accurate to portray the section lines on the index maps to reflect the true length of the section lines. For example, the westernmost end of section A-A' on Figure 2-6A is located at well BH31-87. However, the line of section for A-A' on figures 2-3, 2-4, and 2-5 all extend approximately 2,000 feet west of this boring. This should be corrected.

Rationale: The addition of the section designations to the cross sections allows quicker orientation when examining the figures. The adjustment of the lines of section promote faster orientation and accuracy.

3. Page 2-5, Paragraph 3. The third sentence refers to Figure 2-8c. The work plan copy reviewed contained no Figure 2-8c. It appears that the correct reference is to Figure 2-9.

Rationale: Correct reference to appropriate figures facilitates use of the document.

4. Page 2-98, Paragraph 5. According to this paragraph, the only borehole with volatile organic compounds reported at or below the alluvial/bedrock interface was BH 2587. However, this is incorrect. A review of Table 2-10 indicates that borings 2887, 3187, 3987, 4187, 4787, and 5087 all contain volatiles below the alluvial/bedrock interface. The volatile organic compounds detected are not typically laboratory contaminants nor are they reported with data qualifiers. The statement should be corrected.

Rationale: The work plan should present an objective assessment of the available analytical data to facilitate the planning of RFI/RI activities.

2.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Specific Comments

1. Page 3-1, Paragraph 4. The statement that the work plan describes only the investigative requirements relative to bedrock ground water in OU2 is not accurate and should be corrected. The discussion of applicable or relevant and appropriate requirements (ARARs) in this section focuses primarily on ground water. However, the objectives of the work plan include investigating the horizontal and vertical extent of soil contamination (Table 4-1, page 4-6). In addition, procedures for investigating the extent of soil contamination are included in Section 8.0

Rationale: The objectives to the work plan should remain consistent between different sections.

2.4 DATA NEEDS AND DATA QUALITY OBJECTIVES

No technical comments were generated from a review of this section.

2.5 REMEDIAL INVESTIGATION TASKS

General Comment

1. Section 5.7 includes several lists (all bulleted) of technologies which have been identified for "potential testing." This work plan should be revised to identify the rationale or procedure to be used to decide which (if not all) technologies will actually be tested.

   Rationale: It is not possible to determine whether all the technologies identified will be included in the treatability study or whether some will be eliminated in advance.

Specific Comments

2. Page 5-8, Paragraph 3. The text states that risks will be characterized for all chemicals. The text on page 5-6 indicates the list of contaminants may be reduced to a list of contaminants of concern. This discrepancy should be resolved.

   Rationale: The approach to the risk assessment should be described consistently in order to understand the proposed assessment. If contaminants of concern are identified, there would be no need to characterize the risks associated with all the contaminants detected from OU2.

3. Page 5-10, Paragraph 3. The term "short time frame" should be defined, since technologies apparently will be eliminated from further consideration if they are not felt to be implementable within it.

   Rationale: Unless a resulting remedial action is an interim (as opposed to a long term) measure or being performed under an emergency basis (under the National Contingency Plan), technologies should not be eliminated because of equipment lead times (within reason).

4. Page 5-11, fourth bulleted item. The word "some" or "certain" should be added as an adjective to describe those semivolatile contaminants which are amenable to air stripping. The sentence, as worded presently in the work plan, could mislead one to believe that air stripping is a good technology for all semivolatile contaminants.

   Rationale: Not all semivolatile contaminants are amenable to air stripping. In fact, for semivolatile contaminants, each compound must be evaluated for predicted effectiveness on an individual case basis.

5. Page 5-12, first bulleted item. The last sentence regarding the large amount of sludge generated is a blanket statement which should be deleted or revised. The amount of sludge generated is directly proportional to the levels of contamination. If the levels of contaminants are relatively low, the sludge volume may be low.

Rationale: Evaluating technologies using faulty reasoning could possibly result in eliminating an appropriate technology for the wrong reason.

6. Page 5-13, third bulleted item. The last sentence regarding the large amount of solidified material generated is a blanket statement which should be revised or deleted. The volume of solidified material generated from this process is usually directly proportional to the volume of contaminated material. If the volume of contaminated material is relatively small, the solidified conglomerate volume should also be small.

Rationale: Evaluating technologies using faulty reasoning could possibly result in eliminating an appropriate technology for the wrong reason.

2.6 FEASIBILITY STUDY TASKS

Specific Comments

1. Page 6-2, first bulleted item. The first sentence regarding the identification and evaluation of technology options and selection of a representative process should be revised. First, it should not be the goal to select only one technology per category, if there are other technologies in that category worthy of full evaluation. Two options may exist within the same category and may work better together than individually or separately. Second, the phrase "select" should be revised to "recommend" in reference to choosing technologies. The public and lead agency will actually make the final selection(s).

Rationale: CERCLA guidelines stipulate that preferred technologies be evaluated and recommended to the public for final selection. Work plans for CERCLA sites should follow CERCLA guidelines.

2.7 SCHEDULE

No technical review comments were generated from a review of this section.

2.8 FIELD SAMPLING PLAN

Specific Comments

1. Page 8-13 and 8-14, Table 8-1, Cluster Numbers 11, 12, 13, and 14. The explanation of the purpose for each of these clusters implies that the hydraulic connection between different cluster locations will be determined. However, statements on page 8-5, paragraph 2, specify that only single well aquifer tests will be conducted. It is not clear how hydraulic communication between distant locations will be evaluated when only single well aquifer tests are planned. This discrepancy should be resolved.

   Rationale: Hydraulic communication between distant locations or stratigraphic units is usually determined through multiple well aquifer pumping tests. Discussing how hydraulic communication will be evaluated is important as decisions regarding additional well placements will be made based on these determinations.

2. Page 8-14, Table 8-4, Cluster Numbers 15 and 16. Table 8-1 indicates that monitoring wells will not be completed at cluster locations 15 and 16. A review of the existing analytical data suggests that contamination is probable in this area but that existing well control is sparse (Figure 2-21, 2-22, and 2-23). Bedrock monitoring wells should be included at cluster locations 15 and 16.

   Rationale: Efforts should be made to enhance the completeness of the planned RFI/RI activities wherever possible.

3. Page 8-16, Paragraph 3. The work plan should specify some criteria for selecting the headspace analysis sampling interval within the cored sections. This information is not presented in this discussion or in the referenced SOP addendum.

   Rationale: A very small sample volume is collected for the headspace analysis (enough to fill one-half of a 250 milliter container). Consequently, some criteria should be specified for selecting such a small volume from a cored interval potentially 5 feet in length. Scanning the core with a photoionization detector to identify areas of elevated volatile concentrations may be an alternative.

4. Page 8-17, Paragraph 3. This paragraph lists the geophysical logs that "should" be run. The work plan should specifically identify the geophysical logs that will be run or describe the criteria that will be used to determine the suite of geophysical logs that will be run.

Rationale: The work plan should be specific were possible. This will increase the clarity of the document and decrease the potential for confusion among field personnel conducting the RFI/RI activities.

5. Page 8-30, Paragraphs 3, 4, and 5. The use of distilled water for field, equipment, and trip blanks is not recommended due to the increased potential for introducing contamination from an outside source. ASTM Type II reagent water is recommended for the blank samples.

Rationale: Use of retail distilled water adds unnecessary uncertainty into the field sampling program. Commercially available distilled water is usually packaged in plastic containers and would be expected to contain phthalate-group chemical contaminants introduced from the plastic. Considering the effort and expense undertaken to procure the environmental samples at OU2, only high quality water with documented characteristics should be used for the blank samples.

6. Page 8-31, Table 8-4. This table should be modified to indicate that trip blanks will be used for all samples to be analyzed for VOCs. Trip blanks should be used to monitor shipments of both water and soil samples.

Rationale: Trip blanks are useful to monitor contamination of soil samples as well as water samples. Because acceptable soil matrix blanks are not available for trip blanks, water matrix (ASTM Type II) blanks should be used for both shipments of soil and water samples.

2.9 QUALITY ASSURANCE ADDENDUM

General Comments

1. The quality assurance addendum (QAA) should refer to the most current version of the Rocky Flats site-wide quality assurance project plan (QAPjP). The version cited in the QAA (August 23, 1990) is out of date and should be replaced by the current (March 1, 1991) QAPjP version. References to sections of the QAPjP should be revised to reflect the current version of the QAPjP.

Rationale: Use of current document versions minimizes the potential for confusion and misinterpretation of quality assurance (QA) plans.

2. Sample container, preservation, and holding time requirements are not consistent between the QAA, Section 8.0 of the work plan (the field sampling plan), and SOP 1.13. The frequency of field quality control (QC) sample collection also varies between Tables 9-3 and 8-4.

Rationale: Requirements for sample containers, preservation methods, and holding times are critical to the effectiveness of the field sampling program. Field QC samples are also an important part of the overall project quality assurance/quality control (QA/QC) program. Descriptions of sample handling requirements and QC sampling frequency should be consistent to minimize errors that may subsequently result in the invalidation of data. Agreement concerning correct sampling requirements is necessary prior to the initiation of field activities.

Specific Comments

3. Page 9-3, Section 9.3.1. Data quality objectives (DQOs) for field QC measurements should be included in this section of the QAA. These DQOs are not contained in the site-wide QAPjP. Section 3.3.1 of the QAPjP states, "The field DQOs must be documented in the work plan and summarized in the QAA." The QAA should be expanded to include objectives for field QC measurements such as the acceptable variance in field duplicate, trip blank, and equipment rinsate blank samples.

Rationale: Field QC samples are an important part of the overall project QA/QC. DQOs for these samples should be presented and justified.

4. Page 9-3, Paragraph 2. References to Table 9-1 of the QAPjP should be corrected to indicate Table 9-1 of the QAA. There is no Table 9-1 in the current (or the earlier) version of the QAPjP.

Rationale: Consistent cross-referencing promotes the utility of the QAA.

5. Page 9-17, Section 9.3.5 The method for preparation of trip blanks should be added to this section of the QAA. Section 3.3.5.1.3 (page 3-16) of the current QAPjP refers to the individual site QAAs for the preparation of trip blanks. The QAA and QAPjP should be modified, as appropriate, to be consistent.

Rationale: Trip blanks are an important component of the field QC sample system. The appropriate procedure for the preparation of trip blanks should be clearly described.

6. Page 9-18, Table 9-2. This list of applicable SOPs should be modified to include all current SOPs. SOPs 1.1, 1.2, 3.11, 4.7, 4.8, 4.9, and 5.1 through 5.10 should all be added to this list. If the seven SOPs listed as "to-be-determined (TBD)" are required for field work at OU 2, these SOPs should be submitted for review prior to the initiation of field activities.

Rationale: A complete list of SOPs provides necessary reference information for field operations personnel.

7. Page 9-21, Table 9-3. Footnote 4 of this table should be modified to indicate equipment rinsate blanks will be collected at a frequency of 1 per 20 samples or 1 per day, whichever is more frequent.

Rationale: More frequent collection of equipment rinsate blanks is necessary when less than 20 samples are collected during a day of sampling. This collection frequency for equipment rinsate blanks was agreed upon during a meeting between representatives of EPA, CDH, and EG&G on November 13, 1990.

8. Page 9-21, Table 9-3. The field QC sample collection frequencies presented on this table do not agree with the frequencies presented on Table 8-4 in Section 8.0 of this work plan. Specific examples include:

Table 9-3	Table 8-4
Collect field duplicates 1 per 20 samples or 1 per sampling event, whichever is more frequent	Collect field duplicates 1 per 10 samples
Collect trip blanks 1 per shipping container	Collect trip blanks 1 per 20 samples, for for liquid samples only

Rationale: Field QC samples are an important part of overall project QA/QC. Descriptions of QC sampling frequency should be consistent to minimize errors by field operations personnel that may subsequently result in the invalidation of data.

9. Page 9-22, Paragraph 2. The section describing data validation should be expanded to included field sample DQOs (Table 9-1) as criteria for data validation. These criteria for field data validation are in addition to the requirements described in Section 3.3.4.2 of the site-wide QAPjP.

Rationale: Collected data must satisfy appropriate DQOs to be valid.

10. Page 9-24, Paragraph 4. The reference to requirements for the control of purchased items and services in the QAPjP should be changed from Section 9.0 to Section 7.0. Section 9.0 of the QAPjP (both versions) discusses control of processes.

Rationale: Correct cross-references minimize the potential for misunderstandings.

11. Page 9-25, Paragraph 1. The reference to requirements for sample volumes, containers, and preservation should be changed from Table 7-2 to Table 8-3. Section 7.0 of the work plan discusses the project schedule.

Rationale: Correct cross-references minimize the potential for errors in the use of the work plan.

12. Page 9-27, Table 9-5. The sample container, preservation, and holding time requirements presented on this table do not agree with the requirements presented on Table 8-3 or those listed on Tables A-1 through A-4 in SOP 1.13. Table 1 presents specific examples of inconsistencies between the three tables. These tables should be modified to be consistent. [Note some of the inconsistencies do not create problems. For example, if a 200-milliliter (mL) sample is required for bicarbonate analysis and 500 mL is required to be collected, the quality of the analysis will not be affected.] In cases where samples for several analytes are combined into one sample, a footnote in the table should indicate the required sample volume reflects volume requirements from several analysis methods. For example, two 1-liter (L) bottles may be required for all anion analyses. This 2 liters may reflect the need for a 500-mL sample for each of four individual anions.

Rationale: Requirements for sample containers, preservation methods, and holding times are critical to the effectiveness of the field sampling program. Agreement concerning correct sampling requirements is necessary prior to the initiation of field activities.

TABLE 1

ROCKY FLATS OPERABLE UNIT 2
VARIATIONS IN SAMPLING REQUIREMENTS

	Table 9-5	Table 8-3	SOP 1.13
Water samples			
Carbonate sample volume	500 mL	part of 2 L	200 mL
Chloride sample volume	500 mL	part of 2 L	200 mL
Fluoride sample volume	500 mL	part of 2 L	1 L
Cyanide sample volume	500 mL	1 L	1 L
TCL VOCs sample volume	3-40 mL	2-40 mL	2-40 mL
TCL semivolatile organic compounds sample volume	1 L	1 L	4 L
TCL pesticides/PCBs	1 L	2 L	4 L
Tritium sample volume	100 mL	1 L	125 mL
Tritium holding time	none	6 months	none
TCL metals, holding time for mercury	28 days	6 months	28 days
TCL pesticides/PCBs holding time to extraction	7 days	5 days	7 days

TABLE 1
(continued)

ROCKY FLATS OPERABLE UNIT 2
VARIATIONS IN SAMPLING REQUIREMENTS

	Table 9-5	Table 8-3	SOP 1.13
Soil samples			
Sulfide holding time	28 days	not specified	7 days
TCL metals holding time (excluding mercury)	180 days	10 days	6 months
TCL VOCs holding time	14 days	10 days	7 days
Tritium holding time	180 days	not to exceed 45 days	none

2.10 SOP ADDENDUM

Specific Comments

1. Page 10-3, Paragraph 1. This paragraph states that the headspace sample will be broken up in the jar. The work plan should consider capping the jar immediately and breaking up the sample by agitation, especially if the sample is unconsolidated and can be easily broken up by agitation.

   Rationale: Preserving as much of the original volatile content as possible by immediately capping the sample collection jar after collection will enhance the accuracy of the headspace analyses.

2. Page 10-3, Paragraph 1. This paragraph states that the headspace analysis samples will be placed in a water bath maintained at 25 degree Celsius. The temperature of this water bath should be maintained at 50 to 70 degrees Celsius to better drive out the sample's volatile components. This procedural change should be considered in the work plan.

   Rationale: Trichloroethylene (TCE), tetrachloroethylene (PCE), and hydrocarbons in general tend to become strongly bonded to clay-rich matrices. Increasing the temperature of the water bath will more effectively drive out these volatile components from the soil matrices and enhance the accuracy of the headspace analyses.

3.0 CONCLUSIONS

Overall, the work plan appears to present a useable and acceptable approach to the completion of bedrock RFI/RI activities at OU2. Most of the technical comments generated from this review document minor problems or inconsistencies which can be easily corrected. However, potential major concern is that the work plan relies on a phased approach to completing RFI/RI activities. This could lead to unacceptable delays in completing the OU2 RI. However, review of the OU2 RI data does not indicate that additional field activities would significantly enhance the approach's completeness (with the possible exception of adding ground water monitoring wells at cluster locations 15 and 16). The progress of RFI/RI activities should be closely monitored to assure that completeness of the final RI remains an important objective and that unnecessary delays are avoided.